Site Damage Assessment: Sunken F/V *Stikine*

Andrew DeVogelaere
& Oren Frey

Monterey Bay National Marine Sanctuary
99 Pacific Street; Building 455a
Monterey, CA 93940

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Introduction

On Friday January 6, 2012 at about 0015, the 58' F/V *Stikine* (Figure 1) sank 1.5 miles off Soquel Point (36° 55.717' N, 121° 56.745' W) in 80 feet of water (Figure 2). The vessel sank hull down on sandy bottom habitat with 800-1,000 gallons of marine diesel aboard. All four passengers were rescued. US Coast Guard and Department of Fish and Game OSPR were on scene by 1500 that day with a helicopter, a C-130 aircraft, and a Department of Fish Game vessel to monitor any discharge. A light sheen on the water was observed, and the entire cargo of fuel, along with 50-75 gallons of hydraulic fluid, is believed to have been released at the time of sinking. The vessel had a seine net deployed and it sank connected to the vessel. The boat owner had insurance and contracted with a salvage firm to raise the vessel, but efforts to recover the vessel from the seafloor were unsuccessful due to the position of the net and lead lines, a large load of sardines, and unfavorable weather. In this report we provide a habitat and biological damage assessment of the seafloor.

Figure 1. The F/V *Stikine*, a 58' purse seiner, sank on January 6, 2012 off Soquel Point with a load of sardines. Photo credit: http://www.juneautek.com.

Methods

As part of their effort to raise the F/V *Stikine* and remove associated nets, the salvage firm provided two hours of narrated video from around the sunken vessel. This information was reviewed by Dr. Ivano Aiello (Associate Professor at Moss Landing Marine Laboratories), Dr. James Lindholm (IfAME Director and James W. Rote Distinguished Professor of Marine Science and Policy at California State University Monterey Bay), and Monterey Bay National Marine Sanctuary (MBNMS) Research Coordinator Dr. Andrew DeVogelaere.

During May 2010 shelf characterization cruises completed by the MBNMS / Institute for Applied Marine Ecology (IfAME) partnership, video imagery of habitats surrounding the F/V *Stikine* site was recorded (http://www.sanctuarysimon.org/projects/project_info.php?projectID=100373&site=true). These videos, taken by a remotely operated vehicle (ROV), have facilitated the understanding of Sanctuary resources located on the shelf. Video tapes from transects of the nearby sandy bottom habitat were reviewed by Drs. James Lindholm and Andrew DeVogelaere. A taxonomic distribution plot was created for each transect by the IfAME lab (Figures 3-8). Additionally, a geologic map of the study areas was developed (Figure 2).

Results

- The *Stikine* is resting on sandy bottom habitat, with close proximity to the Purisima formation (Figure 2). Sandy bottom habitats consist of soft sediments such as sand and mud, and host benthic ecosystems by providing homes for many epifaunal and infaunal organisms. Although soft sand is a common habitat in the Sanctuary, the *Stikine* is located within an area historically important for commercial fish trawling and currently important for commercial, halibut hook and line fishermen. The Purisima formation is a relatively complete sequence of sedimentary rocks ranging in age from the latest Miocene to the late Pliocene. Exposed strata in northern Monterey Bay from Santa Cruz to Rio del Mar provide extensive fossilized evidence of marine shelf and nearshore environments. At the *Stikine* site, a vessel recovery team found a 3 to 3.5 foot thick layer of ancient clam shells underneath one foot of soft sand.

- Species commonly found at the site are indicated by May 2010 observations of the surrounding areas made during MBNMS/IfAME ROV surveys. These species include a variety of fishes and both mobile and sessile invertebrates, including crabs, stars, and anemones (Table 1).

Table 1. List of species and/or species groups observed from ROV video and still photographic imagery on 2010 transects in the vicinity of the F/V *Stikine* sinking.

Species Observed	
Fishes	Invertebrates
Combfish	Sand Star- *Luidia spp*.
Slender sole	Cancer crab
Flatfish	Dungeness crab
Poachers	Prawns
Sculpins	Moon snail
Eelpouts	Hermit crab
Lingcod	Hydroids
	Sea Slug
	Bryozoans
	Sea Cucumber
	Octopus
	Sea Pen
	Sun Star- *Rathbunaster*
	Cerianthid Anemone
	Sea Whip
	Spider Crab
	Metridium

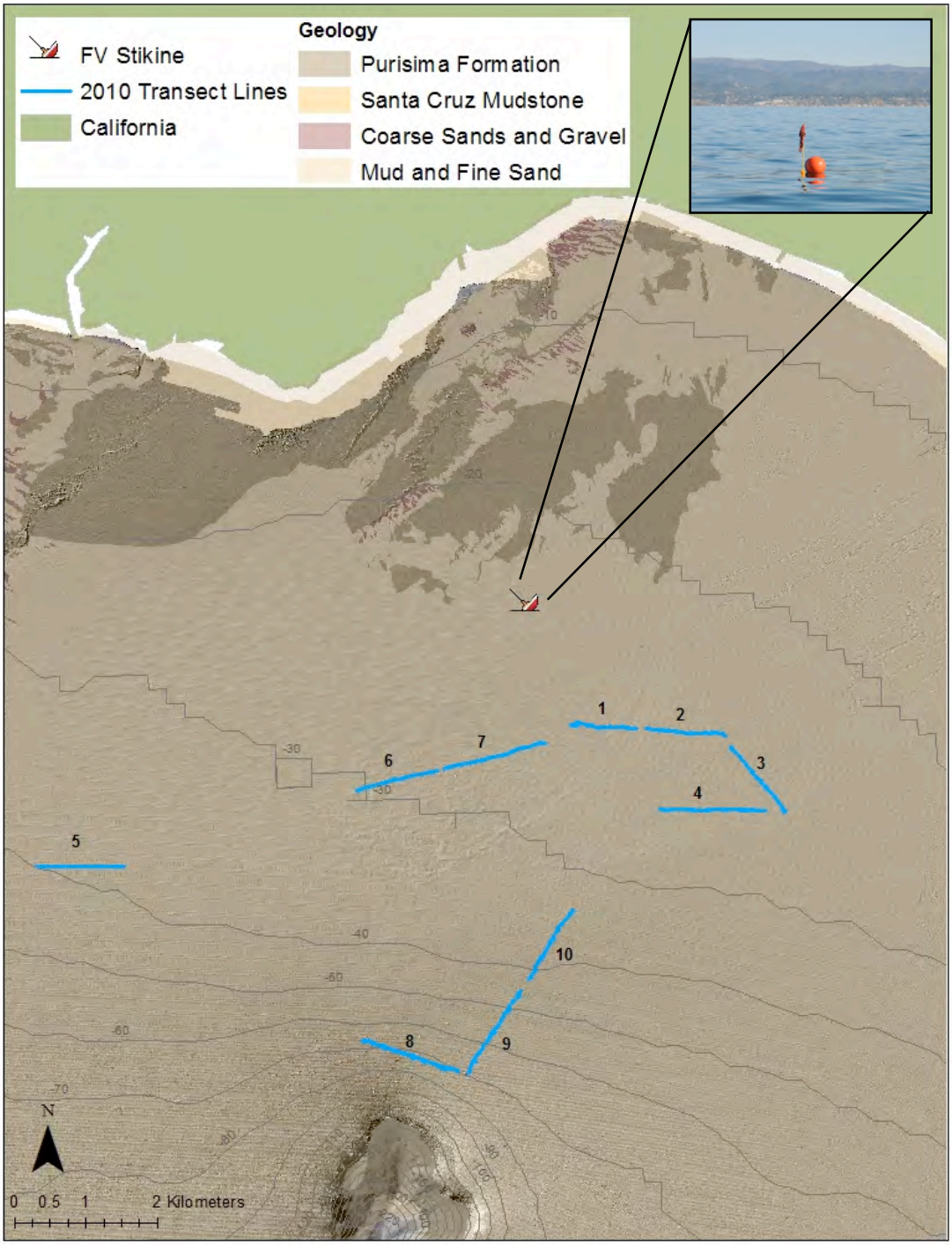

Figure 2. Map of northern Monterey Bay, including the location of the F/V *Stikine* as well as ROV transects conducted by the IfAME in May 2010. Inset shows marker buoy and flag used to mark vessel location. Map credit: Megan Kelly, IfAME.

- Taxonomic distribution plots (TDPs) for transects conducted in 20-30 m water depth (Transects 1-4, 6, and 7) illustrate many observations of fish and mobile and sessile invertebrates (Figs. 3-8).

Conclusions

- A trench approximately 58 feet long, 19 feet wide, and 8-9 feet deep was created, which killed any organisms at the impact site. Length and width of the trench roughly match the dimensions of the *Stikine*.

- Measurement of the trench found that from top to bottom the trench consisted of one foot of soft sand, then 3 to 3.5 feet of ancient clam shells, followed by 2.5 feet of hard-packed sand.

- This habitat is not unique or sensitive enough to require special mitigation.

- The location of the sunken vessel site should be provided to both fishermen and scientists working in the area.

- Video from the salvage team had minimal damage assessment value, and marine ecologists should work directly with future salvage teams to enhance data collection.

- Consideration should be given to follow up monitoring one and two years from the date of the incident. This will determine the habitat recovery rate and change in fishing hazards at the location.

    - Associated budget for consideration: 3 days of R/V *Fulmar* ship time ($ 9,000); technical staff to operate a SeaBotix ROV ($ 2,000); habitat and shipwreck analyses ($ 1,000).

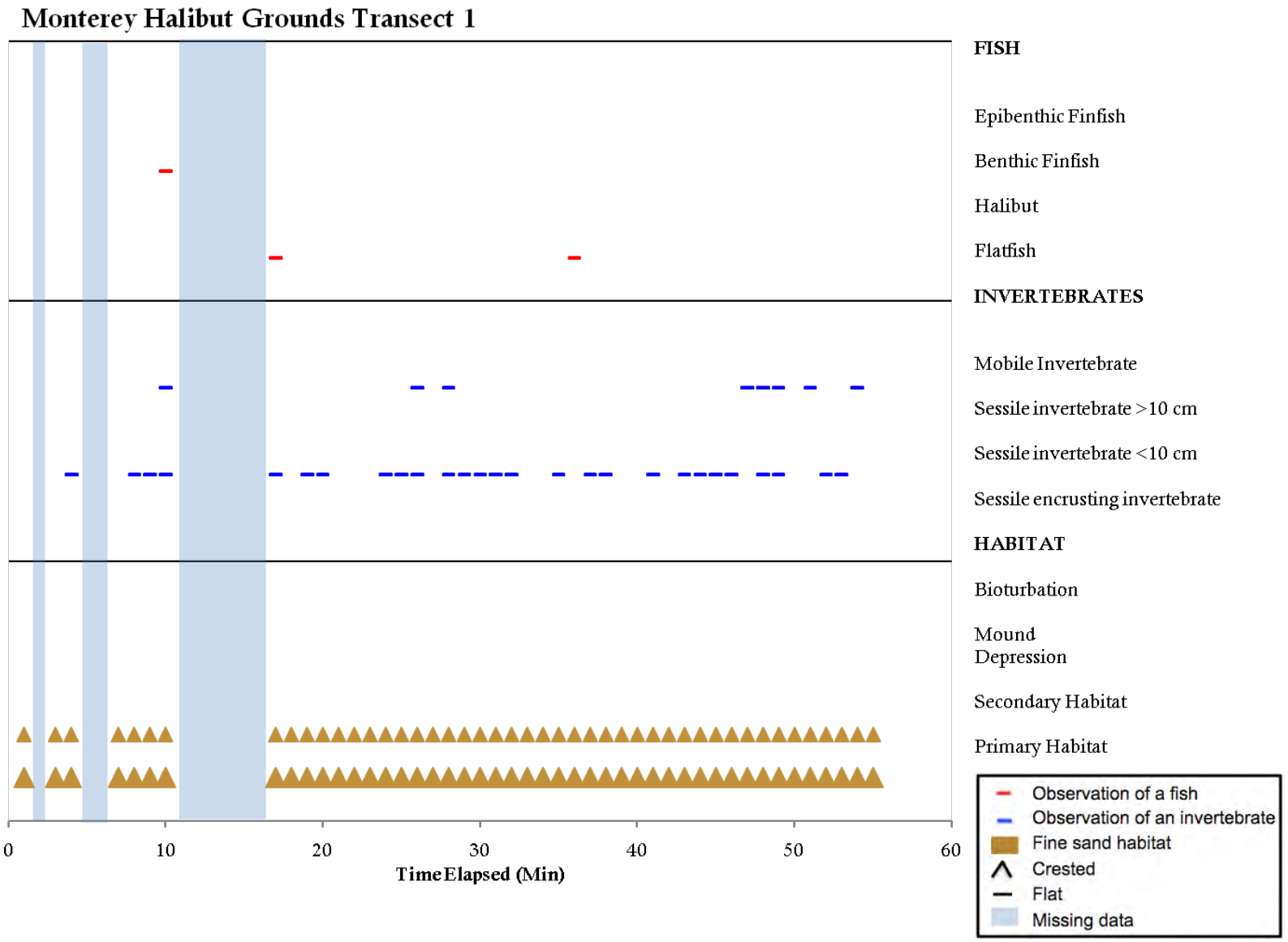

Figure 3. Taxonomic distribution plot for MBNMS/IfAME Transect 1, conducted in 20-30 m water depth. Plot can be read vertically to observe what habitat features and organisms occur at that location, or horizontally to track the distribution of an organism or type across the transect. See Fig. 2 for transect location.

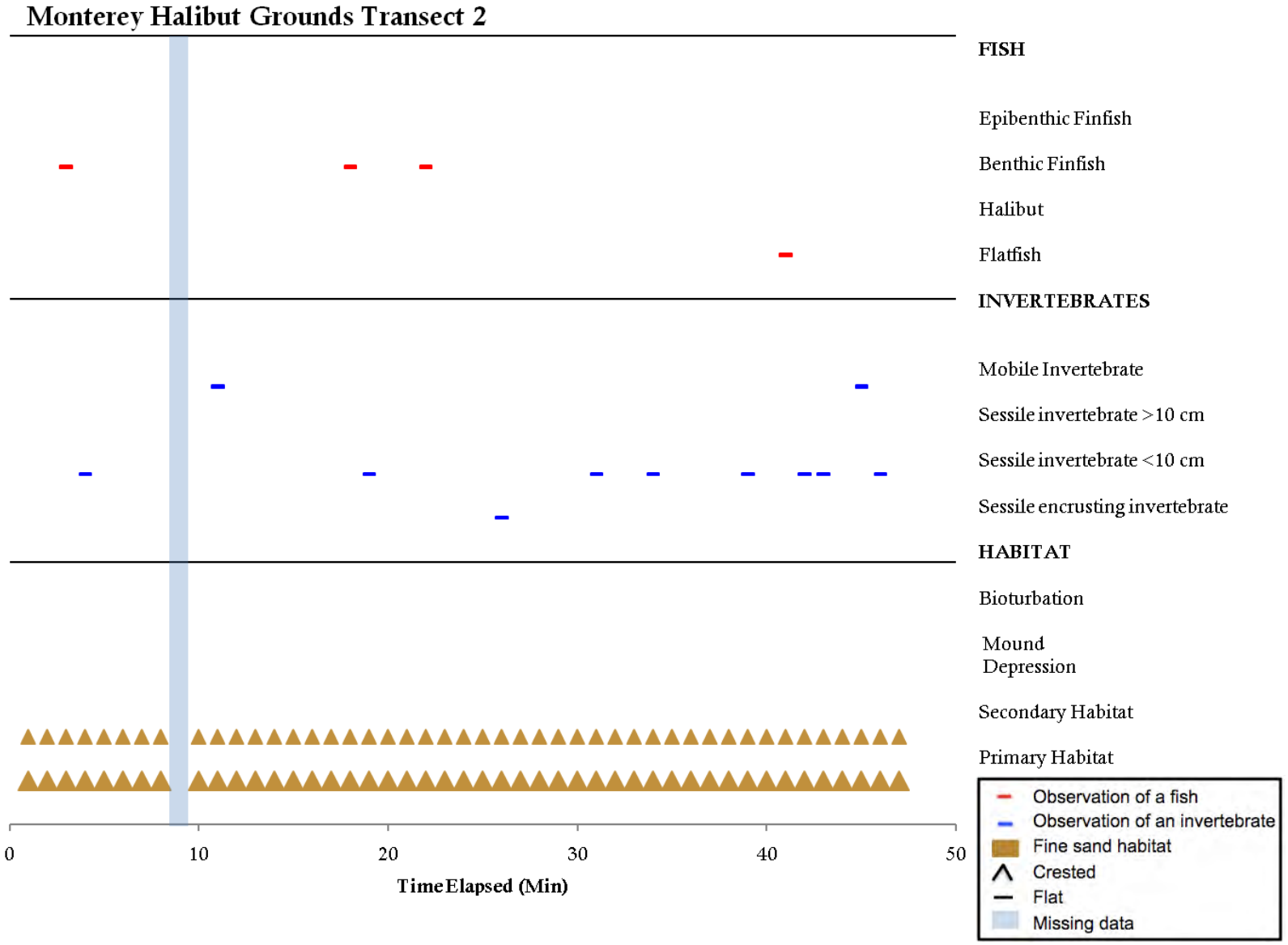

Figure 4. Taxonomic distribution plot for MBNMS/IfAME Transect 2, conducted in 20-30 m water depth. Plot can be read vertically to observe what habitat features and organisms occur at that location, or horizontally to track the distribution of an organism or type across the transect. See Fig. 2 for transect location.

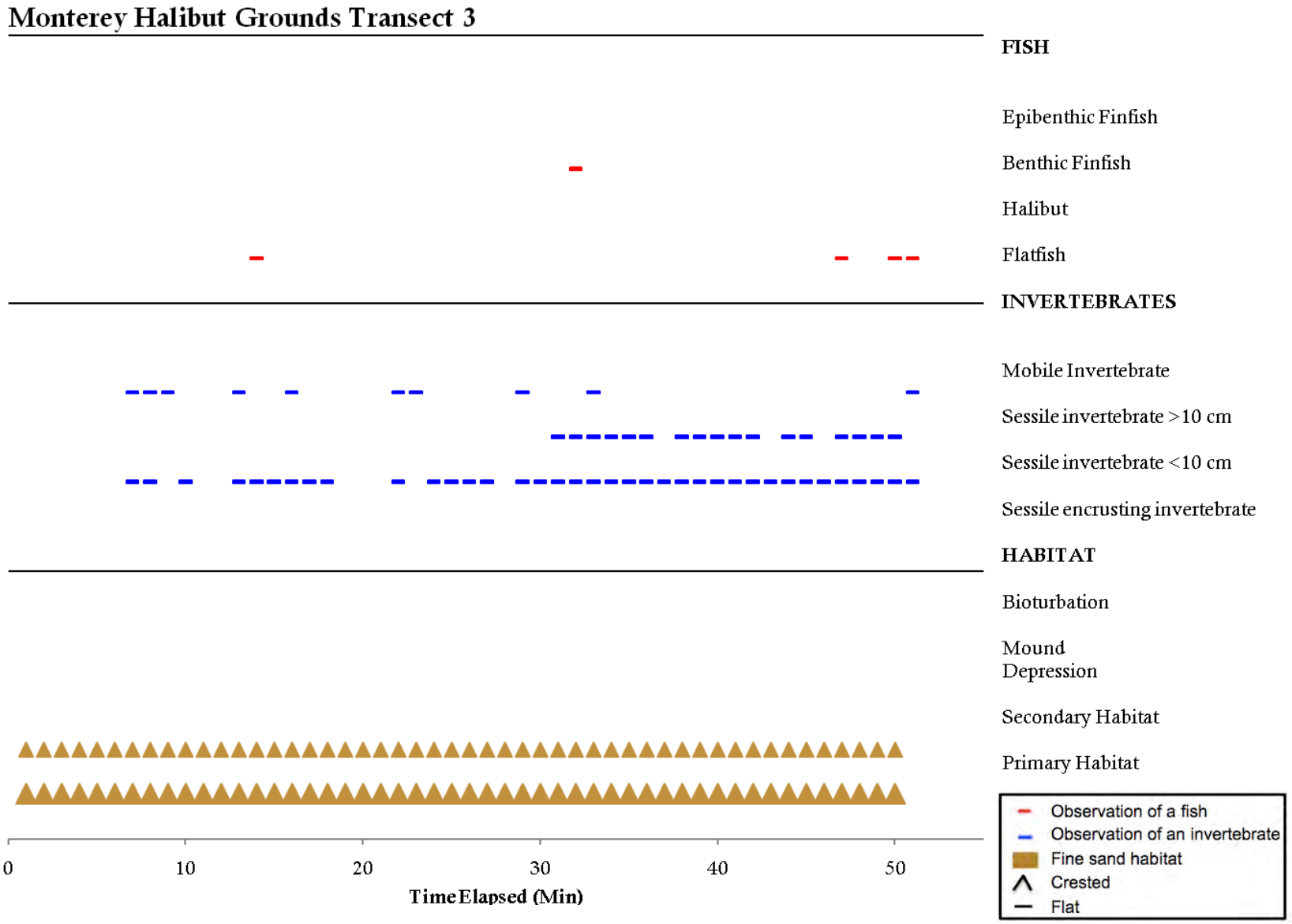

Figure 5. Taxonomic distribution plot for MBNMS/IfAME Transect 3, conducted in 20-30 m water depth. Plot can be read vertically to observe what habitat features and organisms occur at that location, or horizontally to track the distribution of an organism or type across the transect. See Fig. 2 for transect location.

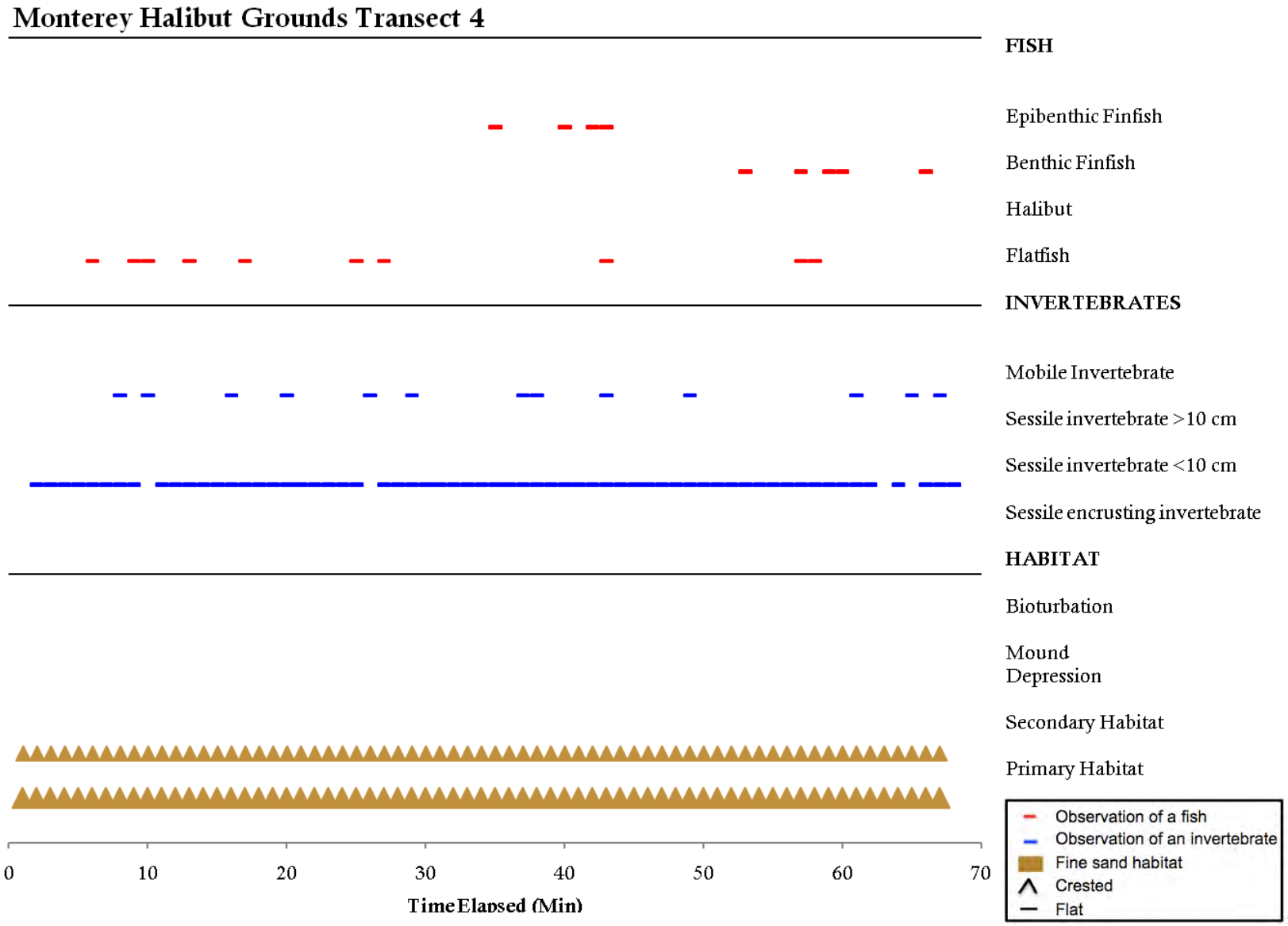

Figure 6. Taxonomic distribution plot for MBNMS/IfAME Transect 4, conducted in 20-30 m water depth. Plot can be read vertically to observe what habitat features and organisms occur at that location, or horizontally to track the distribution of an organism or type across the transect. See Fig. 2 for transect location.

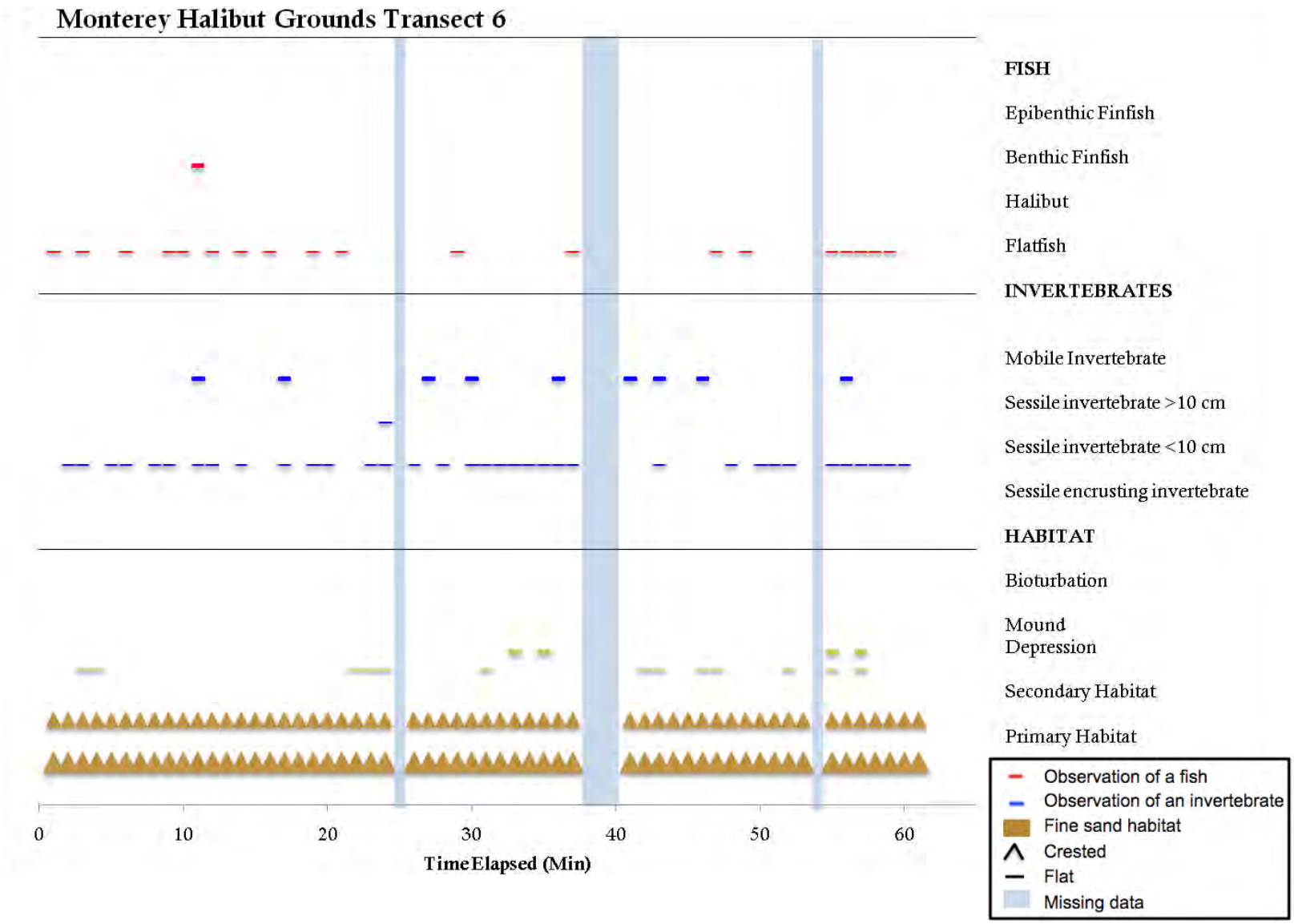

Figure 7. Taxonomic distribution plot for MBNMS/IfAME Transect 6, conducted in 20-30 m water depth. Plot can be read vertically to observe what habitat features and organisms occur at that location, or horizontally to track the distribution of an organism or type across the transect. See Fig. 2 for transect location.

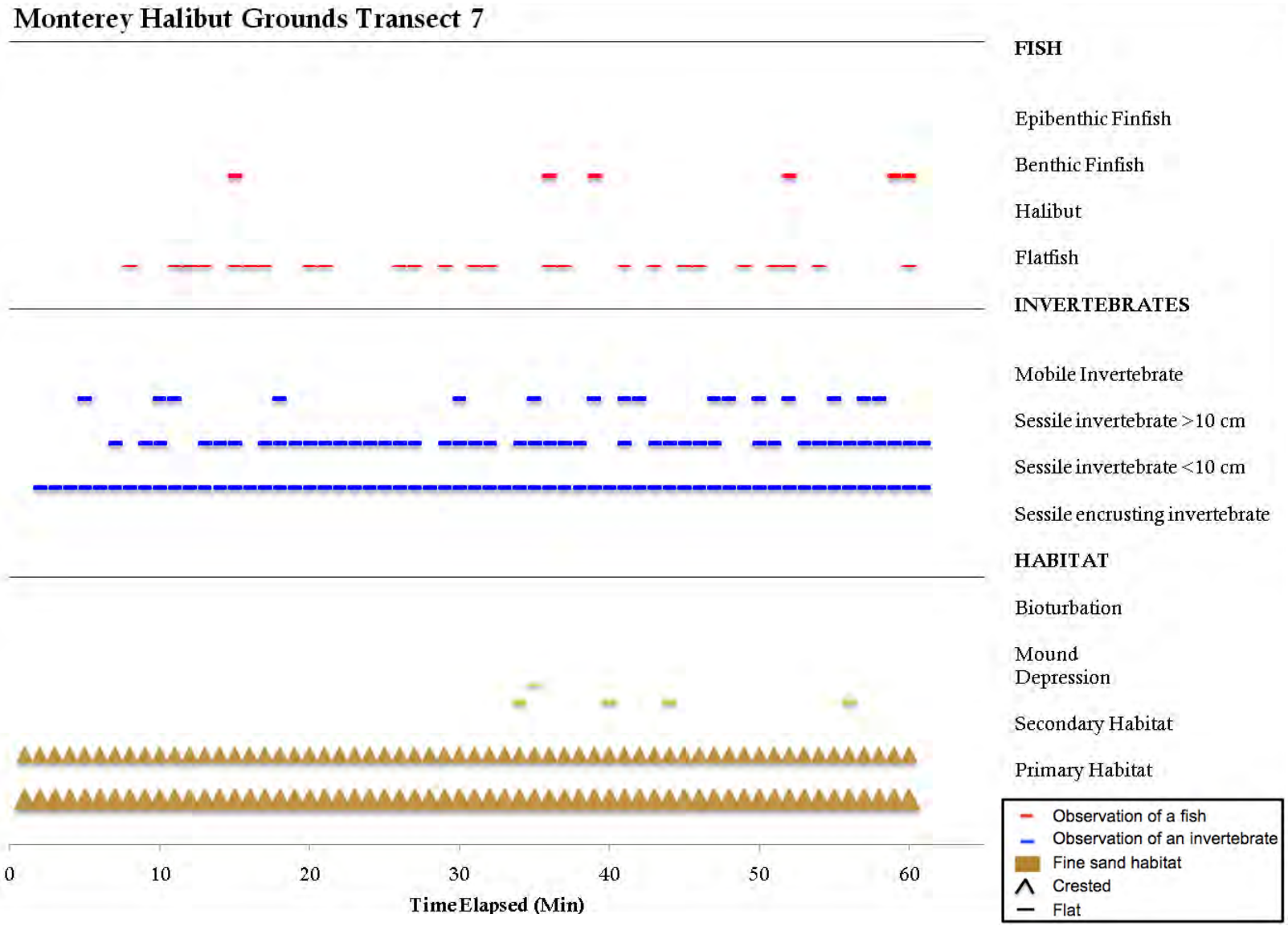

Figure 8. Taxonomic distribution plot for MBNMS/IfAME Transect 7, conducted in 20-30 m water depth. Plot can be read vertically to observe what habitat features and organisms occur at that location, or horizontally to track the distribution of an organism or type across the transect. See Fig. 2 for transect location.